



# Central Coast Agriculture Highlights



SANTA BARBARA COUNTY

DECEMBER 2006

## New Vegetable/Strawberry Advisor comes to Santa Barbara County

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Hugh Smith, Ph.D., joined the University of California Cooperative Extension staff in Santa Maria on December 1, 2006. Hugh will have responsibility for an extension and research program in vegetables and strawberries in Santa Barbara and San Luis Obispo Counties.

Smith earned his BA ('86) degree in Classics at Brown University, and his MS ('93) and Ph.D. ('99) degrees in Entomology from the University of Florida. Before coming to Santa Maria, Smith was working as a post-doctoral colleague with William "Bill" Chaney, Ph.D., on the biological control of aphids in organically grown lettuce in Monterey County.

Since earning his doctorate, Hugh has had a variety of experiences. He was a visiting lecturer at the Universidad del Valle-Altiplano, Sololá, Guatemala, a consultant for Child Fund in Vietnam, a Fulbright visiting lecturer in Guatemala, and an agricultural entomologist in Hawaii and the Northern Mariana Islands.

As he begins his new position locally, Hugh will be visiting with Central Coast vegetable and strawberry growers, pest control advisors, and other members of the agriculture community to determine

local needs and to initiate some extension and research projects.

Hugh Smith may be reached by calling the Santa Maria Cooperative Extension Office - phone (805) 934-6240 or by e-mail [hasmith@ucdavis.edu](mailto:hasmith@ucdavis.edu)



# Effects of Varying Planting Density on Blueberry Yield and Fruit Size

Mark Gaskell

Alternative management practices are important to small scale blueberry growers who need to improve production efficiency. We have established trials to evaluate different plant and row spacing configurations to provide different planting densities and the effects on blueberry yield and fruit quality.

Initial harvest data is now available from two blueberry trials established in 2002 on a farm in the Edna Valley near San Luis Obispo. The trials are using Sharpblue and Misty cultivars established in different planting configurations with one or two rows per bed. The two rows per bed trial compares treatments that provide a range of approximate planting densities between 2540 and 4235 plants per acre. These plants are planted in double, staggered rows on 6 ft. wide beds, separated 12 ft. center to center at spacing of 18", 24", and 30". These treatments correspond to planting densities of 4235, 3178 and 2540 plants per acre. Treatment plots are replicated five times.

A second trial compares the Misty and Sharpblue cultivars planted at a range of single row treatments of 18", 24" and 30" spacing and, thus, compares approximate planting densities of 1744 plants per acre (30"), 2180 plants per acre (24"), and 2904 plants per acre (18"). These plants are planted in single rows on 4 ft. wide beds, separated 10 ft. center to center. Treatment plots are replicated five times. Typical plant densities commonly used for southern highbush blueberries in Califor-

nia are 30" spacing, utilizing approximately 1744 plants per acre.

The trial was first harvested in 2005, but data was not collected the first season. Data collection began in late May of 2006 with delayed harvest following an unusually cool, wet spring. The two cultivars showed marked yield differences across the two trials with the Sharpblue consis-

tently out-producing the Misty cultivar at all plant spacings (Pr<0.05). The Misty production was higher in the initial harvest weeks, but Misty had a narrower production peak than Sharpblue in this season. Misty yields fell rapidly, and after the third or fourth week Sharpblue yields were consistently higher than Misty (Fig. 1-2).

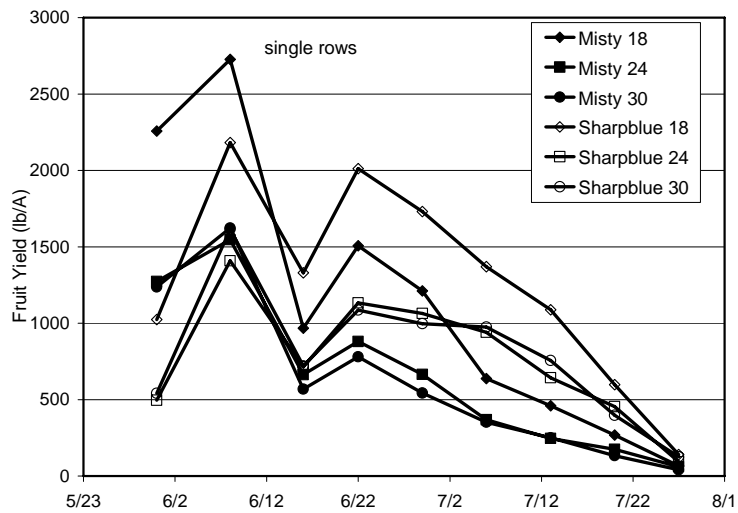


Fig. 1. Weekly fruit yield of Misty and Sharpblue blueberries at varying plant spacing in single rows per bed. San Luis Obispo, CA. 2006 season.

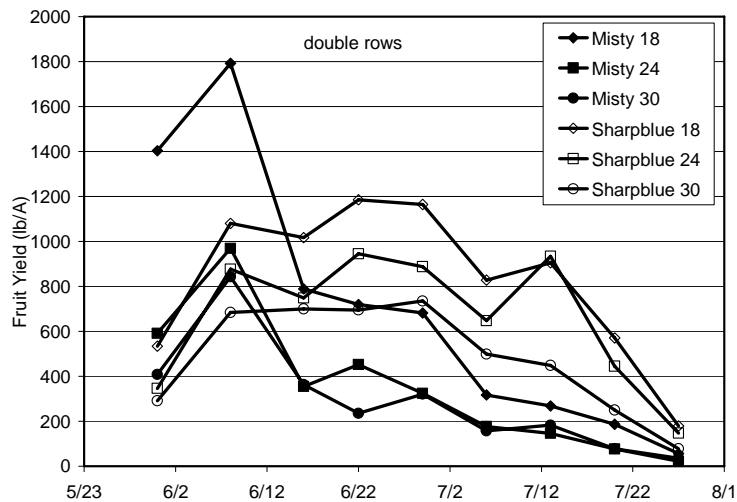


Fig. 2. Weekly fruit yield of Misty and Sharpblue blueberries at varying blueberry plant spacing in double rows per bed. San Luis Obispo, CA. 2006 season.

The results also indicate a clear difference among planting spacing in both single and double rows per bed ( $P < 0.05$ ). In the single bed configuration, both Misty and Sharpblue total yields were highest at 18" spacing, followed by 24" plant spacing, and finally the 30" spacing (Fig. 3). Overall, however, there was no statistically significant difference between the 24" and 30" spacing in the single rows. In the double row trial (Fig. 4), total yields of both Misty and Sharpblue were again highest at the 18" spacing, but the total yields for the 24" and 30" spacings were not significantly different from each other.

No clear pattern emerged for fruit size among cultivars or planting spacing and data from the single row plots as shown in Fig. 5 for illustration.

As plants are planted more densely, they compete with each other for light and nutrients, and usually fruit size falls off and often fruit number as well. The plants in the field reach an optimum spacing and configuration for a given cultivar in a specific environment.

The one- and two-row configurations were evaluated in separate trials so they cannot be analyzed or compared with strict statistical confidence. Still, these trials were side by side in the same field and planted at the same time from the same groups of transplants. It is noteworthy that the highest yields in the two-row configuration were from 10,000 to more than 12,000 lb per acre (Fig. 4) compared to the one-row configuration with highest yields in the 6000 to 8000 lb per acre range (Fig. 3).

These results are important because they indicate that blueberry yields appear to increase with higher planting densities down to 18" between plants on either single or double rows per bed - at least in the initial harvest seasons. This harvest period is the fourth year from planting 18-month old plants in the field. Data from subsequent seasons will be important to determine if these yield advantages to higher planting densities persist. Or rather as plants continue to grow if they will reach the point of over-competition, and yield and fruit size will be adversely affected at higher planting density.

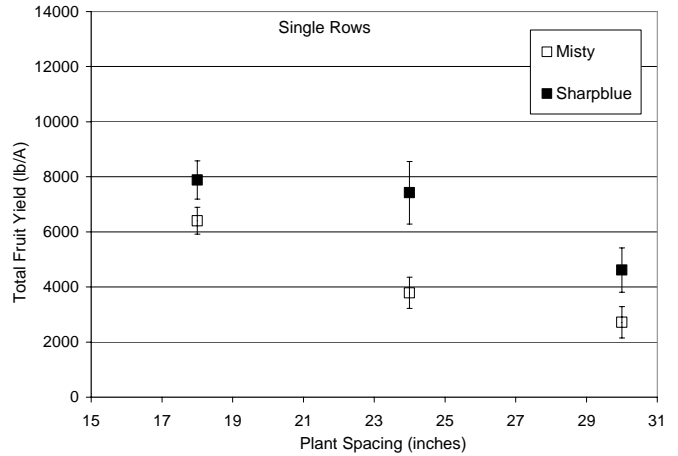


Fig. 3. Total fruit yield of blueberries at 18", 24", or 30" spacing in single rows per bed. San Luis Obispo, CA. 2006 season.

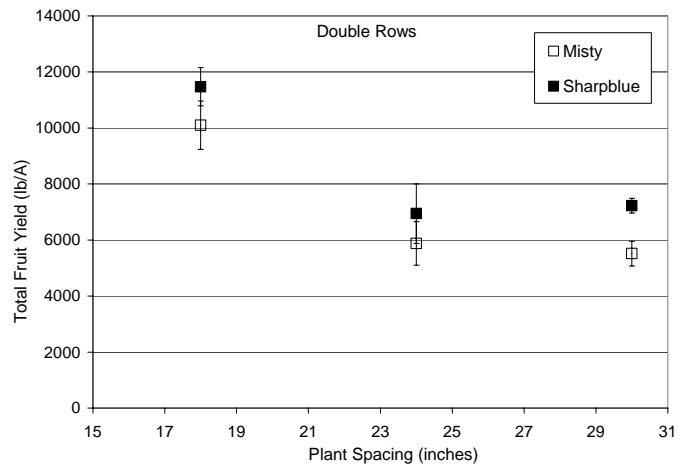


Fig. 4. Total fruit yield of blueberries at 18", 24", or 30" plant spacing in double rows. San Luis Obispo, CA. 2006 season.

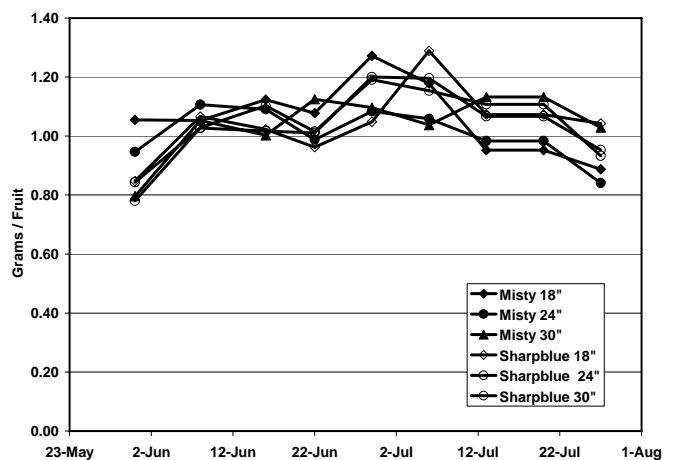


Fig. 5. Weekly average fruit size from Misty and Sharpblue blueberries planted at varying plant spacings in single rows per bed. San Luis Obispo, CA. 2006 season.

# Bovine Trichomonosis: Essential Facts & Testing

Information provided by Food Animal Reproduction & Herd Health Services, Veterinary Medical Teaching Hospital, School of Veterinary Medicine, University of California, Davis.

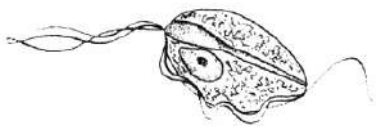
## Wayne Jensen

Recently I received a call from one of my cooperators with the sad news that a number of his bulls tested positive with Trichomonosis. That is certainly bad news but fortunately he learned of it before he turned these bulls out for the breeding season. These relatively young bulls had to be slaughtered and replaced.

### What is bovine trichomonosis?

Bovine trichomonosis (a.k.a. trichomoniasis) is an important cause of economic loss in cattle operations that use natural service. Surveys in California beef cattle operations have shown that more than 15 percent of herds had at least one infected bull.

This disease is caused by a protozoan organism called *Trichomonas foetus*, and under magnification looks similar to the line drawing below.



This organism lives in the folds of the bull's penis and internal sheath. In cows, the organism colonizes the vagina, cervix, uterus and oviducts.

### How does it get transmitted?

Trichomonosis is a venereal disease of cattle. It is transmitted from cow to cow by a bull or, in rare cases, by contaminated semen or insemination equipment or non-hygienic artificial insemination (AI) procedures.

### How does it affect cattle?

The most common signs in an infected herd are:

- Early abortion (too early to find an aborted fetus).
- Repeated breeding resulting in long breeding seasons.
- A wide range of gestational ages at pregnancy check.
- Pyometra (pus-filled uterus) in about five percent of cows.
- In first-time infected herds, it is common to end with a 50 to 70 percent calf crop strung out over three to eight months.
- Bulls show no clinical signs.
- Cows can commonly clear the infection within a few months, however, infection in bulls over 4 years of age is usually permanent and is the main source of transmission from one breeding season to another.

### How can you test your herd for infection?

Testing for *Trichomonas foetus* is usually done on breeding bulls by performing a scraping of the penis and prepuce in order to obtain a preputial (internal sheath) fluid sample, and inoculating the sample into special culture media. If one bull is found positive, you should assume that the whole herd is exposed.

Studies of positive bulls have shown that this culture method will miss about 10 to 20 percent of infected bulls if the test is performed only once. So, if no infected bull is found on the basis of one culture of all the bulls in the

herd, then we can be 80 to 90 percent

sure that the herd is "clean."

### How can you treat infected herds?

The disease is self-limiting in cows, as opposed to bulls, which will be permanently infected. After several heat cycles, most cows and heifers clear the infection, but this may take months.

There is a vaccine available for *Trichomonas foetus* (Trichguard or Trichguard Plus [Ft. Dodge]). The vaccine helps cows/heifers to clear the infection in a matter of weeks (vs. months in unvaccinated cows). In most cases, it does not prevent infection.

No vaccine efficacy has been shown in bulls.

There is no approved treatment for infected bulls.

### How can you prevent the disease in your herd?

- Use young, fertile bulls or artificial insemination (AI).
- Culture new bulls at breeding soundness exam time.
- Keep a closed herd and test any animal that you buy.
- And while it wasn't mentioned in this article, keep your perimeter fences in good repair.

### How can you control the disease in your herd?

If one of your bulls is positive for trichomonosis, it is recommended to cull all bulls and vaccinate all females twice, one month apart. The best option to control trichomonosis is to use artificial



insemination. If you want to keep your bulls, you can vaccinate all females annually, but it would be better to cull all bulls and open cows before next season. An alternative, if you don't want to cull all bulls, is to sample

them at least three times at weekly intervals. With three negative tests, you can be 99 percent confident that a bull is negative. Given the sensitivity of the culture diagnostic test, the table below will give you an idea of the confidence you should have in a

“negative” bull, depending on how many times he is tested.

**How sure can you be that your bulls are clean after a negative test result?**

<b>First test</b>	<b>Date:</b>	<b>80% sure</b>
<b>Second test (one week later)</b>	<b>Date:</b>	<b>96% sure</b>
<b>Third test (one week later)</b>	<b>Date:</b>	<b>99% sure</b>

## Extensive *E. coli* O157:H7 Study in the Salinas Valley

Wayne Jensen

In recent years I have worked with Dr. Edward (Rob) Atwill, a UC Davis School of Veterinary Medicine specialist in waterborne infectious diseases. We worked on a number of projects to document the presence of pathogens such as *Cryptosporidium parvum*, Giardia, and *E. coli* O157:H7 in cattle and wildlife, primarily ground squirrels. Atwill is now part of an extensive study of *E. coli* O157:H7 in the Salinas Valley.

Before the year's end, a team of scientists will begin collecting data for a long-planned four-year study on the sources of *E. coli* O157:H7 in the Salinas Valley. The study is funded with a \$1.2 million research grant from the USDA.

“Exactly where the *E. coli* is coming from is a focus of the grant,” said Atwill, co-principal investigator of the study. “There has been much speculation that livestock or wildlife are possible sources of the *E. coli* O157:H7 in these outbreaks in fresh pro-

duce from Salinas Valley region. We will examine livestock and wildlife that are out on the rangeland up above the farmland, and wildlife that live near canals and on the periphery of vegetable fields on the valley floor.”

In the first two years of the study, crews will collect thousands of samples of domestic animal and wildlife droppings; creek, ditch and irrigation water; farm soil and lettuce growing on Salinas Valley farms. (This study was designed before the late summer 2006 outbreak of *E. coli* O157:H7 associated with spinach. Several previous outbreaks of the virulent bacteria were associated with contaminated Salinas Valley lettuce.)

The data collected in the field will be carefully analyzed to identify the vertebrates that are sources of *E. coli* O157:H7, assess the climate, landscape attributes and irrigation management practices that are correlated with increased risk of contamination, and determine whether contaminated lettuce is associated with certain farming practices or environ-

mental factors.

“We need to deal with facts,” said Robert Mandrell, research leader of the USDA-Agricultural Research Service Produce Safety and Microbiology Research Unit, and the principal investigator of the study. “Right now, we can't say what's happening. We will get facts that will give us a basis to determine what more we need to investigate.”

Facts will come also from the use of sophisticated tests called MultiLocus Variable tandem repeat Analysis (MLVA) and Pulsed Field Gel Electrophoresis (PFGE) to “fingerprint” and track bacteria found in various animals, waterways, farms and vegetables. PFGE is the same process used by the Centers for Disease Control to discover whether foodborne disease outbreaks are related to one another, as was found to be the case with spinach in September 2006, and MLVA is a recent method for assessing the relatedness of strains isolated.

“Most strains of *E. coli* O157:H7 bacteria are so similar, we need to look at the genome to accurately trace the source through the environment,” Mandrell said.

The scientists hope their research will also help them understand the puzzling timing of recent *E. coli* outbreaks. *E. coli* bacteria are found more often in Salinas Valley waterways in the winter, when rainstorms can wash the bacteria from streets, farms, and rangeland into creeks, streams, sloughs and rivers. However, the outbreaks associated with fresh vegetables tend to happen during the summer and fall.

“Is there a hydrological link between what is occurring on rangeland above the fields and the *E. coli* contaminated vegetables that are reported in the summer and fall? That’s what we are going to test,” Atwill said.

Certain strains of *E. coli* bacteria normally live in the intestines of cattle, wildlife and humans causing no harm. The O157:H7 strain became known in 1982 as a result of an outbreak associated with hamburger meat. It causes severe diarrhea and can lead to kidney damage and even death. Young

children and the elderly are particularly vulnerable. However, some humans with *E. coli* O157:H7 show no symptoms at all.

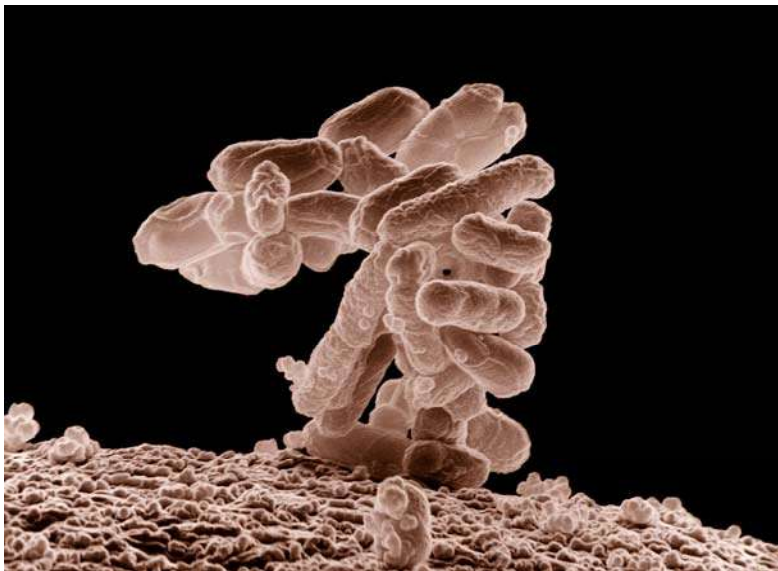
“There’s a lot we don’t know about why certain people don’t get sick,” Mandrell said. “Are certain strains more virulent? The particular strain in the spinach outbreak seems to be particularly virulent.”

Compared to other strains of *E. coli*, the O157:H7 strain is unusually persistent in the environment. It survives in low temperatures, such as cold water and under refrigeration. Heat, in the pasteurization of milk and fruit juices or in cooking, destroys *E. coli* bacteria. *E. coli* on the outer surfaces of cuts of meat are easily destroyed during cooking. But *E. coli* in ground meat may be deep within the hamburger. Cooked hamburgers with pink meat in the middle can still have live *E. coli* O157:H7 cells.

Cooking vegetables also destroys bacteria, but contaminated vegetables meant to be eaten raw pose the problem. Washing rarely completely cleans all the bacteria off and very little bacteria can make a person ill. It is thought that only 10 to 100 bacteria can cause disease in humans; a large animal with *E. coli* O157:H7, such as a cow, sometimes can shed millions of bacteria per gram of feces.

The information from Mandrell, Atwill and their colleagues’ *E. coli* study will be used to inform growers about specific strategies they can use to prevent contamination of vegetables in the field, to educate the public about the potential impacts of rangeland runoff, and to develop effective management practices for improving water quality.

The scientists involved in the study are Mandrell; Atwill; Michael Cooley, microbiologist, USDA-ARS-WRRC-PSMRU; Ken Tate, UC Cooperative Extension rangeland watershed specialist, UC Davis Department of Plant Sciences; Royce Larsen, UC Cooperative Extension area natural resource watershed advisor, San Luis Obispo County; Leta Crawford-Miksza, Chief, Food Microbiology Section, Food and Drug Laboratory Branch, California Department of Health Services; Janet Mohle-Boetani, Chief, Disease Investigations Section, Infectious Diseases Branch, California Department of Health Services; and Michelle Jay-Russell, Western Institute for Food Safety and Security, UC Davis and California Department of Health Services.



Colorized low-temperature electron micrograph of a cluster of *E. coli* bacteria. Individual bacteria in this photo are oblong and colored brown.

Photo by Eric Erbe; digital colorization by Christopher Pooley.

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## New Book on Vegetable Diseases

Mark Gaskell

Two plant pathologists with the University of California, **Steven Koike** (UC Cooperative Extension, Monterey County) and **Albert Paulus** (UC Riverside), have teamed up with a researcher from the United Kingdom to write a new reference book entitled Vegetable Diseases: A Color Handbook. The book emphasizes disease diagnosis, field biology, and other practical aspects of the dis-

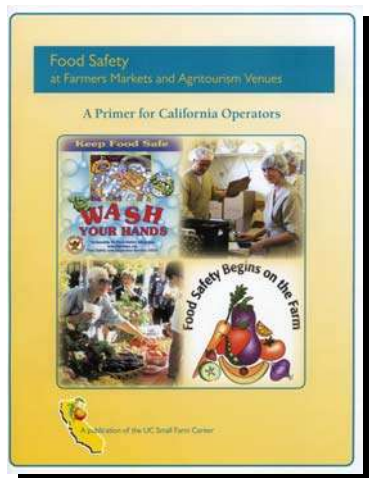
eases that affect vegetables. The book cites current research that has been published for each disease. This 448-page book includes over 600 high quality color photographs and should be useful to researchers, technicians, extension personnel, growers, pest control advisors, and students interested in agriculture and plant pathology. Because of the interest that Koike has in minor vegetable crops, the book includes disease

descriptions for crops such as artichoke, arugula, basil, cilantro, endive, fennel, leafy mustards, Swiss chard, and others. Such specialty crops are rarely covered in other publications.

The book is available in North America from Academic Press/Elsevier Books (<http://books.Elsevier.com>). Search for ISBN No. 0-12-373675-7 or by the authors' names.

## New Publication: Food Safety at Farmers' Markets and Agritourism Venues

Mark Gaskell



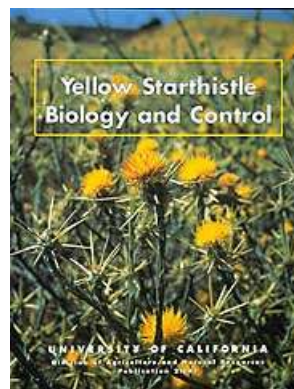
This publication provides a basic guide to understanding food safety issues relevant to California certified farmers' markets and agritourism operations. It is designed for farmers, ranchers, and certified farmers' market managers, but can also be useful as a resource for educating employees about food safety concerns and regulations, and as a reference for other agricultural professionals.

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## New Publication: Yellow Star Thistle: Biology and Control

Wayne Jensen

This publication describes the biology of the Yellow Star Thistle and a variety of methods used in its control. Publication 21541. \$6.00. Order from: UC Cooperative Extension, 624-A West Foster Road, Santa Maria, CA 93455.





**Mark Gaskell**

## Mark your Calendar! California Farm Conference

The 20th California Farm Conference will be held March 4-6, 2007, at the Monterey Beach Resort, Monterey, CA. The California Farm Conference is the state's premier gathering of small farmers and those who support them.

The California Farm Conference is very pleased to announce **Michael Dimock**, of the Roots of Change Fund, who will present the keynote address at the 2007 California Farm Conference. Noted author and radio personality **Michael Olson** will present the banquet address during the conference. **Marita Cantwell**, Interim Director of the University of California Small Farm Center, will be the featured speaker during the breakfast session of the final day of the conference.

The three-day educational conference includes on-farm tours, focused workshops, general educational sessions and opportunities for peer networking. General ses-

sions feature prominent speakers who provide an overview of important social, economic and environmental issues impacting California agriculture and California's small farmer.

The farm tours visit local farms, farmers' markets and wineries. The farms selected for tours are those that have been successful in specialty and underrepresented commodity crop enterprises.

The short courses consist of intensive full-day or half-day sessions, either at the conference host facility or off-site. Separate sessions are designed for beginning farmers, experienced farmers, and farmers' market managers.

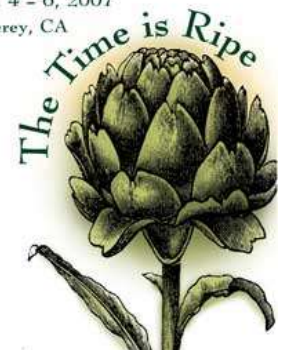
The workshops include a variety of topics with information useful for producers to increase their economic viability, and feature local farmers, farmers' market managers, and representatives of public and private agencies in

California's agricultural industry as workshop organizers and presenters.

For more information see the official website at:  
<http://www.californiafarmconference.com/>

The 20th Convening  
of the CALIFORNIA  
FARM CONFERENCE

March 4 - 6, 2007  
Monterey, CA



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or contact this office at:  
(805) 934-6240

## Ground Squirrel Control Best Management Practices

**Mark Gaskell**

The University of California has established an Internet website for information on managing ground squirrels.

The URL is:

<http://groups.ucanr.org/gsbmp>



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## Free Trees!

In 2005, the Agricultural Commissioner's Office, along with Kevin Merrill of Mesa Vineyard Management and Premiere Coastal Vineyard, and Jerry Markota of JM Oak Tree Nursery and Markota-Landscaping teamed up with Santa Ynez High School agriculture students in an exciting pilot program. Acorns were collected by Lottie Martin, the Oak Specialist, and Jerry Markota provided potting materials and planting expertise, and the high school students propagated the acorns and cared for the oak seedlings. Kevin Merrill planted the 1000+ seedlings throughout the hills of Premiere Coastal Vineyard.

The program was a huge success and is being expanded to include several other local high schools. Teachers and students are working with the Oak Specialist to develop an individualized program that meets each school's interests and needs. Expected to participate are Santa Ynez Valley, Carpinteria, Cabrillo, Cuyama, Santa Maria and Pioneer Valley High Schools.



*Acorn pre-germination*

*©Regents of the University of California*

In order to make this program work, we need land owner participation and lots of acorns. Acorns are the biggest limiting factor for the program. You can help by looking for oaks that have plenty of acorn production and by contacting the Oak Specialist with the location of the trees. If the trees are on private property, Ms. Martin will work with the land owners to collect the acorns at their convenience. Acorns should be visible on the trees now and should be ready to harvest starting around October.

A second opportunity to get involved is to plant some of the FREE oak seedlings on your property. The seedlings are expected to be ready around March 2007. If

you are interested in participating in the program, contact Ms. Martin, so she can work with you on acorn collection. The students can grow the seedlings for you. Also, be aware that the acorns should be local for optimal results.

This program is provided FREE to the land owners and can only be successful with your participation. It is a great learning experience for the students and provides them with an opportunity to get involved in a local issue.

Lottie Martin can be reached by calling the Agricultural Commissioner's Office at (805) 934-6200, by e-mail at [lmartin@xo.santa-barbara.ca.us](mailto:lmartin@xo.santa-barbara.ca.us) or by visiting <http://agcommissioner.com>

## Gaskell Named to California Organic Products Advisory Committee



**Mark Gaskell** has been appointed as a Technical Representative (alternate) on the California Organic Products Advisory Committee by the California Department of Food and Agriculture for the period November 1, 2006 - October 31, 2009.

This committee provides advice and guidance to the Governor

and other state policy makers on the needs and problems of the organic agriculture industry. Mark has been a Farm Advisor responsible for Small Farms and Specialty Crops in Santa Barbara and San Luis Obispo Counties since 1995.

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